We Claim

1. A method, in a receiver, of coherently matching an input to a reference signal, wherein the input comprises a set of signals which have a mutual relationship and wherein the input has a non-ideal coherence with respect to a property of the reference signal, the method comprising:

processing the set of signals to determine which of the set of signals has a predetermined association with the reference signal; and,

selecting, as an optimum output, at least one signal which meets the predetermined association.

2. A method according to claim 1 wherein the step of processing the set of signals comprises determining which of the set of signals is most closely matched to the property of the reference signal.

3. A method according to claim 2 wherein the property is phase and the step of processing the signals comprises determining which of the set of signals is most closely aligned to the phase of the reference signal.

4. A method according to claim 3, wherein the property is phase, wherein there is an in-phase datum representing the phase of the reference signal and an anti-phase datum, and wherein the step of processing the signals comprises determining which of the set of signals is most closely matched in phase to the in-phase datum or anti-phase datum.

5. A method according to claim 4 wherein, if it is determined that the optimum signal is most closely matched to the anti-phase datum, the method further comprises the step of inverting the selected signal.

6. A method according to claim 4 wherein the step of determining which of the set of signals is most closely matched in phase to the in-phase datum or anti-phase datum comprises determining which of the set of input signals has the greatest amplitude.

7. A method according to claim 4 wherein the step of determining which of the set of signals is most closely matched in phase to the in-phase datum or anti-phase datum comprises determining which of the set of input signals has the smallest amplitude and determining, from the mutual relationship of the set of signals, which of the remainder of the set of signals has the greatest amplitude.

8. A method according to claim 4 wherein the step of determining which of the set of signals is most closely matched in phase to the in-phase datum or anti-phase datum comprises determining which of the set of input signals is changing sense and determining, from the mutual relationship of the set of signals, which of the remainder of the set of signals has the greatest amplitude.

9. A method according to claim 6 wherein the step of determining which of the set of input signals has the greatest amplitude compares each signal to a threshold which is a function of the reference signal.

10. A method according to claim 4 wherein the step of determining which of the set of signals is most closely matched in phase to the in-phase datum or anti-phase datum comprises comparing pairs of the set of signals.

11. A method according to claim 10 further comprising filtering the outputs of the comparisons whereby to average the comparisons over a period of time.

12. A method according to claim 10 wherein the step of comparing pairs of the set of signals comprises cross-correlating pairs of the set of signals.

13. A method according to claim 12 further comprising determining which of the set of signals appears in the correlations having the greatest value.

14. A method according to claim 12 further comprising determining which of the set of signals is anti-correlated with the other signals.

15. A method according to claim 12 further comprising filtering the outputs of the correlations whereby to average the correlations over a period of time.

16. A method according to claim 10 wherein the comparisons are performed on digital versions of the set of signals.

17. A method according to claim 16 wherein the digital versions of the set of signals are regenerated signals.

18. A method according to claim 16 further comprising time-averaging the results of the comparisons and comparing each of a set of time-averaged comparisons with a decision threshold.

19. A method according to claim 18 wherein the decision threshold is representative of a mean level between binary levels of the digital signals.

20. A method according to claim 16 further comprising determining which comparison, from the set of comparisons, has an output different from the others, this being indicative of the pair of set signals contributing to that comparison not being most closely matched to the reference signal.

21. A method according to claim 16 wherein the set of signals comprise M signals which are derived from an input signal which is modulated by an N-phase modulation scheme (M>N), the method further comprising determining, from the comparisons, which N/2 of the set of M signals have the lowest cross-correlation between them.

22. A method according to claim 21 wherein, if more than N/2 possible signals are identified as having the lowest cross-correlation between them, the method further comprises selecting the N/2 signals which are most equally spaced in phase, or phase and polarization.

23. A method according to claim 15 wherein the step of comparing the digital versions of the signals comprises comparing pairs of signals using XOR gates.

24. A method according to claim 1 wherein the step of processing the set of signals occurs in a processing path which is in parallel to a main path and wherein the step of selecting an optimum output comprises delaying the set of input signals in the main path whereby to compensate for the delay introduced by the processing path.

25. A method according to claim 1 wherein the set of input signals are derived from a single input signal, the set of signals representing phase-shifted versions of the single input signal.

26. A method according to claim 25 wherein the set of input signals are electrical signals which have been derived from optical signals received by an optical front end to the receiver.

27. A method according to claim 25 wherein the set of input signals are substantially equally spaced in phase, or phase and polarization.

28. A method according to claim 1 further comprising deriving clock timing for the processing from at least one of the set of signals.

29. A method according to claim 28 comprising deriving clock timing for the processing from an average taken across all of the set of signals.

30. A method according to claim 1 further comprising making the step of selecting an optimum output in synchronism with a level change in the input.

31. A method according to claim 1 further comprising processing the set of signals to determine which of the set of signals has an alternative predetermined association with the reference signal and selecting, as a further optimum output, the signal which meets the alternative predetermined association.

32. A method according to claim 1 wherein there is also a secondary input comprising a second set of signals which have a mutual relationship with respect to a property of each signal, the method further comprising processing the second set of signals to determine which of the second set of signals has a predetermined association with the reference signal and selecting, as a second optimum output, the signal which meets the predetermined association.

33. A method according to claim 32 wherein the set of signals of the input and the second set of signals of the secondary input are in quadrature and the step of processing the signals uses signals of both sets.

34. A method according to claim 32 wherein the steps of selecting an optimum output and selecting a second optimum output are synchronised.

35. A method of processing a signal in a communications system comprising:

receiving a signal from a transmission path;

generating a set of mutually related signals representing phase-shifted versions of the received signal by applying the received signal and a reference signal to a coupling network, the set of signals having a non-ideal coherence with respect to the reference signal;

processing the set of signals to determine which of the set of signals has a predetermined association with the reference signal; and,

selecting, as an optimum output, at least one signal which meets the predetermined association.

36. A control apparatus for a coherent receiver which is arranged to receive a signal from a transmission path and to generate a set of mutually related signals, the set of signals having a non-ideal coherence with respect to a reference signal, the control apparatus comprising:

a processing stage which is arranged to process the set of signals to determine which of the set of signals has a predetermined association with the reference signal and ,

a selector which can select, as an optimum output, at least one signal which meets the predetermined association.

37. A coherent receiver arrangement comprising:

a first input port for receiving a signal from a transmission path;

a second input port for receiving a reference signal;

a coupling network which is operable to generate a set of mutually related signals, the set of signals having a non-ideal coherence with respect to the reference signal;

a processing stage which is arranged to process the set of signals to determine which of the set of signals has a predetermined association with the reference signal; and,

a selector which can select, as an optimum output, at least one signal which meets the predetermined association.

38. A communications network incorporating a receiver according to claim 37.

39. A computer program product for implementing a method of controlling operation of a coherent receiver, the receiver being arranged to receive a signal from a transmission path and to generate a set of mutually related signals, the set of signals having a non-ideal coherence with respect to a reference signal, wherein the computer program product comprises instructions which are arranged to cause the receiver to perform the steps of:

processing the set of signals to determine which of the set of signals has a predetermined association with the reference signal and,

selecting, as an optimum output, at least one signal which meets the predetermined association.